

**PAT-NO:** JP02002268436A

**DOCUMENT-IDENTIFIER:** JP 2002268436 A

**TITLE:** FIXING DEVICE AND IMAGE FORMING DEVICE

**PUBN-DATE:** September 18, 2002

**INVENTOR-INFORMATION:**

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**APPL-NO:** JP2001066494

**APPL-DATE:** March 9, 2001

**INT-CL (IPC):** G03G015/20, B65H029/54 , H05B003/00

**ABSTRACT:**

**PROBLEM TO BE SOLVED:** To enhance a separation performance by reducing the curvature radius of a separation part without applying excessive loads on a fixing roller and a fixing belt, and to surely separate a recording material without applying oil and installing a separation pawl and without remarkably deteriorating the durability of the fixing roller, etc.

**SOLUTION:** The fixing device 1 is provided with the fixing roller 4, the fixing belt 2 and a pressure roller 5, etc. The surface hardness of the fixing roller 4 is made lower, and also the flexural rigidity of the fixing belt 2 is made lower. The fixing belt 2 follows suit to the shape of the fixing roller 4 at the exit of the nip part, then, the curvature radius R is reduced at the exit of the nip part. Then, a paper 11 is easily separated by making good use of the stiffness of the paper 11.

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**TITLE: Fixing apparatus for copier, has fixing roller with low surface hardness and enlarged contact surface and thin fixing belt with low bending elasticity and small radius of curvature at outlet of nip section**

**PATENT-ASSIGNEE: RICOH KK[RICO]**

**PRIORITY-DATA: 2001JP-0066494 (March 9, 2001)**

**PATENT-FAMILY:**

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**APPLICATION-DATA:**

<b>PUB-NO</b>	<b>APPL-DESCRIPTOR</b>	<b>APPL-NO</b>	<b>APPL-DATE</b>
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**ABSTRACTED-PUB-NO: JP2002268436A**

**BASIC-ABSTRACT:**

**NOVELTY - A thin fixing belt (2) is suspended between a fixing roller (4) and a heating roller (3). The fixing roller has low surface hardness and enlarged contact surface with respect to pressure roller (5). The fixing belt has low bending elasticity and small radius of curvature at outlet of the nip section.**

**DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for image forming device.**

**USE - For image forming device (claimed) such as copier, printer, facsimile.**

**ADVANTAGE - The recording material is separated reliably without applying surplus load to fixing roller or fixing belt. Cost is reduced by avoiding use of isolation nail and application of oil. Suppresses winding of the recording material to the fixing belt and resulting toner offset.**

**DESCRIPTION OF DRAWING(S) - The figure shows the front elevational view of the fixing apparatus.**

**Fixing belt 2**

**Heating roller 3**

**Fixing roller 4**

**Pressure roller 5**

**CHOSEN-DRAWING: Dwg.1/7**

**TITLE-TERMS: FIX APPARATUS COPY FIX ROLL LOW SURFACE HARD ENLARGE CONTACT  
SURFACE THIN FIX BELT LOW BEND ELASTIC RADIUS CURVE OUTLET RIP  
SECTION**

**DERWENT-CLASS: P84 Q36 S06**

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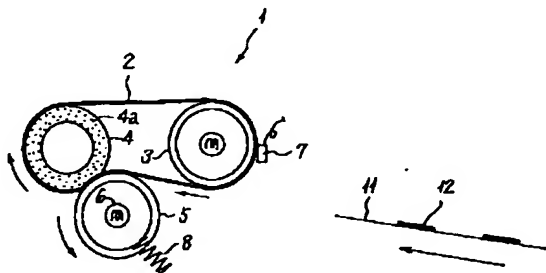
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(54) 【発明の名称】 定着装置・画像形成装置

## (57) 【要約】

【課題】 定着ローラや定着ベルトに過剰な負荷をかけることなく分離部の曲率半径を小さくできて分離性能の向上を図ることができ、オイル塗布や分離爪を設けることなく、また、定着ローラなどの耐久性を著しく低下させることなく記録材を確実に分離することができるようにする。

【解決手段】 定着装置1は、定着ローラ4と、定着ベルト2と、加圧ローラ5等を有している。定着ローラ4の表面硬度を低くし、且つ、定着ベルト2の曲げ剛性の低いものとしている。定着ベルト2はニップ部の出口の定着ローラ4の形状に倣うため、ニップ部の出口の曲率半径Rは小さくなる。これにより、用紙11のコシを利用して該用紙11を容易に分離することができる。



## 【特許請求の範囲】

【請求項1】表面に弾性層を有する定着ローラと、内部に熱源を有する加熱ローラと、該定着ローラと加熱ローラ間に張架された無端状の定着ベルトと、該定着ローラに対向して設けられ該定着ベルトを介して該定着ローラに圧接する加圧ローラとを有し、該定着ベルトと加圧ローラで形成されるニップ部で記録材上に担持されている未定着トナー像を加熱、加圧する定着装置において、上記定着ローラの表面硬度を低くして該定着ローラへの上記加圧ローラの食い込み量を大きくし、且つ、上記定着ベルトの厚みを小さくして該定着ベルトの曲げ弾性を低くし、上記ニップ部の出口における該定着ベルトの曲率半径を小さくしたことを特徴とする定着装置。

【請求項2】表面に弾性層を有する定着ローラと、内部に熱源を有する加熱ローラと、該定着ローラと加熱ローラ間に張架された無端状の定着ベルトと、該定着ローラに対向して設けられ該定着ベルトを介して該定着ローラに圧接する加圧ローラとを有し、該定着ベルトと加圧ローラで形成されるニップ部で記録材上に担持されている未定着トナー像を加熱、加圧する定着装置において、上記ニップ部の出口近傍で上記定着ベルトに当接する分離補助部材を有し、該分離補助部材によって該ニップ部の出口近傍における上記定着ベルトの曲率半径を局所的に小さくしたことを特徴とする定着装置。

【請求項3】請求項2記載の定着装置において、上記分離補助部材が、上記定着ベルトに従動して回転するローラであることを特徴とする定着装置。

【請求項4】請求項2記載の定着装置において、上記分離補助部材が上記定着ローラの弾性層を圧力により歪ませることにより上記定着ベルトの曲率半径を小さくしていることを特徴とする定着装置。

【請求項5】請求項2記載の定着装置において、上記分離補助部材が上記定着ベルトの回転方向に対して負荷を掛けて該定着ベルトを弛ませることにより該定着ベルトの曲率半径を小さくしていることを特徴とする定着装置。

【請求項6】請求項1乃至5のうちの一つに記載の定着装置において、トナーが少なくとも結着樹脂と着色剤とワックスを含有し、上記定着ベルトは少なくとも基材と弾性層と表面離型層の3層構造を有していることを特徴とする定着装置。

【請求項7】像担持体に形成された静電潜像を現像手段によりトナー像として可視像可し、該トナー像を記録材に転写し、該トナー像を保持した記録材をベルト定着方式の定着装置に通して定着を行う画像形成装置において、上記定着装置が、請求項1乃至6のうちの一つに記載のものであることを特徴とする画像形成装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、未定着の画像を定着するためのベルト定着方式の定着装置、該定着装置を備えた複写機、プリンタ、ファクシミリ等の画像形成装置に関する。

## 【0002】

【従来の技術】この種の画像形成装置では、例えば像担持体としての感光体上に原稿画像の画像情報に基づいた静電潜像を形成し、該静電潜像を現像手段によりトナー像とし、該トナー像を記録材としての用紙上に静電的に転写する。トナー像を転写された用紙は定着装置へ送られ、ここで熱と圧力によりトナー像が用紙に溶融・定着される。ベルト定着方式の定着装置は、例えば特開平10-307496号公報に記載されているように、定着ローラと、内部にハロゲンヒータ等の熱源を有する加熱ローラとの間に定着ベルトが張架され、定着ローラに対向して配置された加熱ローラを該定着ベルトを挟んで該定着ローラに圧接する構成を有している。定着ベルトと加熱ローラとの間に形成されるニップ部に、トナー像を担持した用紙を通すことにより定着がなされる。熱容量の小さなベルトに蓄熱させて定着することにより、立ち上がり時間が早く、広いニップ幅によって低温による定着が可能で、上方に凸となるニップ形状により、トナーが定着ベルトに転移するいわゆるトナーオフセットの防止を図っている。

【0003】ところで、ベルト定着方式の定着装置では、トナーオフセットの他に、ニップ部の出口で用紙が定着ベルトに巻き付いて分離が良好になされないという問題がある。この問題に対処すべく、特開平2000-206815号公報には、定着ローラと加圧ローラの圧接部に、定着ローラ側に凸となるニップ部を形成し、ニップ部の幅方向（用紙搬送方向）の少なくとも出口側端部に、画像接触面の大きいすなわち曲率の大きい凸形状の変形部分を形成した構成が開示されている。特開平7-92837号公報には、ベルト定着方式ではないが、分離を良好にすべく、薄肉管とゴムローラとのニップ部に対して転写材の搬送方向下流側の近傍に、薄肉管を凹ませてその薄肉管の曲率半径Rより小さい曲率半径rの曲がり形成する曲がり形成手段を設けた構成が開示されている。

## 【0004】

【発明が解決しようとする課題】ベルト定着方式の定着装置において、オイル塗布なしにトナーオフセットを防ぐためには、離型性に優れたPFA、FEP、PTFEなどのフッ素樹脂を定着ベルトの表層に形成する必要がある。また、定着後の画像上の梨地状光沢ムラを低減した均一な画像を得るためには、表層の下に100～300μmの弾性層が必要であり、基材を含めると少なくとも3層以上の層構成となる。このような3層構成の定着ベルトは曲げ剛性が高いため、図7に示すように、ニッ

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ア部の出口で定着ローラを歪ませ、すなわち定着ローラの形状に倣わないため、ニップ部の出口の形状の曲率半径Rがどうしても大きくなってしまふ。この場合、用紙が曲げられずに分離するため、用紙のコシが十分活用されず、分離性が低下し、トナーオフセットの発生や定着ベルトへの用紙の巻き付きなどが発生する問題があった。図7において、符号4は定着ローラ、符号5は内部にハロゲンヒータ6を有する加圧ローラ、符号2が定着ベルトを示している。

【0005】特開平2000-206815号公報に記載された技術では、均一な光沢を得るためには定着ベルトに弾性が必要であり、どうしても定着ベルトの層構成が厚くなってしまふが、その場合にニップ部の出口の曲率半径が大きくなり、用紙のコシによる分離が困難となる。特開平7-92837号公報に記載の技術では、定着ローラとして0.08乃至0.25mmの薄肉の金属円管が使用されている。定着ローラには加圧ローラの押圧によりニップ部が形成されており、且つ、定着ローラは駆動手段によって回転するようになっている。そのためには、定着ローラにある程度の剛性が必要となる。その定着ローラを曲率が変わる程凹ませることは非常に困難である。逆に曲率が変わる程弾性に富んだ定着ローラであれば、加圧ローラの押圧により変形してしまい、トナーを定着するのに必要なニップ幅や圧力が得られない。

【0006】そこで、本発明は、定着ローラや定着ベルトに過剰な負荷をかけることなく分離部の曲率半径を小さくできて分離性能の向上を図ることができ、オイル塗布や分離爪を設けることなく、また、定着ローラなどの耐久性を著しく低下させることなく記録材を確実に分離することができる定着装置、及びこれを備えた画像形成装置の提供を、その目的とする。

【0007】

【課題を解決するための手段】上記目的を達成するために、請求項1記載の発明では、表面に弾性層を有する定着ローラと、内部に熱源を有する加熱ローラと、該定着ローラと加熱ローラ間に張架された無端状の定着ベルトと、該定着ローラに対向して設けられ該定着ベルトを介して該定着ローラに圧接する加圧ローラとを有し、該定着ベルトと加圧ローラで形成されるニップ部で記録材上に担持されている未定着トナー像を加熱、加圧する定着装置において、上記定着ローラの表面硬度を低くして該定着ローラへの上記加圧ローラの食い込み量を大きくし、且つ、上記定着ベルトの厚みを小さくして該定着ベルトの曲げ弾性を低くし、上記ニップ部の出口における該定着ベルトの曲率半径を小さくした、という構成を採っている。

【0008】請求項2記載の発明では、表面に弾性層を有する定着ローラと、内部に熱源を有する加熱ローラと、該定着ローラと加熱ローラ間に張架された無端状の

定着ベルトと、該定着ローラに対向して設けられ該定着ベルトを介して該定着ローラに圧接する加圧ローラとを有し、該定着ベルトと加圧ローラで形成されるニップ部で記録材上に担持されている未定着トナー像を加熱、加圧する定着装置において、上記ニップ部の出口近傍で上記定着ベルトに当接する分離補助部材を有し、該分離補助部材によって該ニップ部の出口近傍における上記定着ベルトの曲率半径を局部的に小さくした、という構成を採っている。

10 【0009】請求項3記載の発明では、請求項2記載の定着装置において、上記分離補助部材が、上記定着ベルトに従動して回転するローラである、という構成を採っている。

【0010】請求項4記載の発明では、請求項2記載の定着装置において、上記分離補助部材が上記定着ローラの弾性層を圧力により歪ませることにより上記定着ベルトの曲率半径を小さくしている、という構成を採っている。

20 【0011】請求項5記載の発明では、請求項2記載の定着装置において、上記分離補助部材が上記定着ベルトの回転方向に対して負荷を掛けて該定着ベルトを弛ませることにより該定着ベルトの曲率半径を小さくしている、という構成を採っている。

【0012】請求項6記載の発明では、請求項1乃至5のうちの一つに記載の定着装置において、トナーが少なくとも結着樹脂と着色剤とワックスを含有し、上記定着ベルトは少なくとも基材と弾性層と表面離型層の3層構造を有している、という構成を採っている。

30 【0013】請求項7記載の発明では、像担持体に形成された静電潜像を現像手段によりトナー像として可視像可し、該トナー像を記録材に転写し、該トナー像を保持した記録材をベルト定着方式の定着装置に通して定着を行う画像形成装置において、上記定着装置が、請求項1乃至6のうちの一つに記載のものである、という構成を採っている。

【0014】

40 【発明の実施の形態】以下、本発明の一実施形態を図1乃至図3に基づいて説明する。なお、従来例と同一部分は同一符号で示す。まず、図3に基づいて、画像形成装置としてのカラー複写機の全体構成及び動作について概略的に説明する。露光手段としての書き込み光学ユニット400は、カラスキャナ200からのカラー画像データを光信号に変換して原稿画像に対応した光書き込みを行い、像担持体である感光体402上に静電潜像を形成する。該書き込み光学ユニット400は、レーザーダイオード404、ポリゴンミラー406とその回転用モータ408、f/θレンズ410や反射ミラー412等により構成されている。感光体402は、矢印で示すように反時計回りの向きに回転され、その周囲には、感光体クリーニングユニット414、除電ランプ416、電

位センサ420、回転式現像装置422のうちの選択された現像器(図3では現像器438)、現像濃度パターン検知器424、中間転写ベルト426等が配置されている。

【0015】回転式現像装置422は、ブラック用現像器428、シアン用現像器430、マゼンタ用現像器432、イエロー用現像器434と、角現像器を回転させる図示しない回転駆動部を有している。各現像器は、静電潜像を可視像化するために、現像剤の穂を感光体402の表面に接触させて回転する現像スリーブや、現像剤

を汲み上げて攪拌するために回転する現像パドル等を有している。待機状態では、回転式現像装置422は、ブラック現像の位置にセットされており、コピー動作が開始されると、カラスキャナ200で所定のタイミングからブラック画像のデータの読み取りがスタートし、この画像データに基づいてレーザ光による光書き込み・静電潜像(ブラック潜像)の形成が始まる。

【0016】このブラック潜像の先端部から現像するために、ブラック用現像器428の現像位置に潜像先端部が到達する前に、現像スリーブを回転開始してブラック潜像をブラックトナーで現像する。そして、以後、ブラック潜像領域の現像動作を続けるが、潜像後端部がブラック現像位置を通過した時点で、速やかにブラックのための現像位置から次の色お現像位置まで、回転式現像装置422が回転する。当該動作は、少なくとも、次の画像データによる潜像先端部が到達する前に完了させる。像形成サイクルが開始されると、まず、感光体402は矢印で示すように反時計回りの向きに、中間転写ベルト426は時計回りの向きに、図示しない駆動モータによって回転させられる。中間転写ベルト426の回転に伴って、ブラックトナー像形成、シアントナー像形成、マゼンタトナー像形成、イエロートナー像形成が行われ、最終的にブラック(Bk)、シアン(C)、マゼンタ(M)、イエロー(Y)の順に、中間転写ベルト426上に重ねられ、トナー像が形成される。

【0017】中間転写ベルト426は、駆動ローラ444、転写対向ローラ446a、446b、クリーニング対向ローラ448及び従動ローラ群に張架されており、図示しない駆動モータにより駆動制御されるようになっている。感光体402に順次形成されるブラック、シアン、マゼンタ、イエローの各トナー像が中間転写ベルト426上で正確に順次位置合わせされ、これによって4色重ねのベルト転写画像が形成される。このベルト転写画像は転写コロナ放電器454により記録材(用紙)に一括転写される。

【0018】給紙バンク456内の各記録紙カセット458、460、462には装置本体内のカセット464に収容された用紙のサイズとは異なる各種サイズの用紙が収容されており、これらのうち、指定されたサイズ紙の収容カセットから、該指定された用紙が給紙コ

6によってレジストローラ対470方向に給紙・搬送される。図3において、符号468はOHP用紙や厚紙等のための手差し給紙トレイを示す。像形成が開始される時期に、用紙は上記いずれかのカセットの給紙口から給送され、レジストローラ対470のニップ部で待機する。そして、コロナ放電器454に中間転写ベルト426上のトナー像の先端がさしかかるときに、丁度用紙先端がこの像先端に一致するようにレジストローラ対470が駆動され、用紙と像のレジスト合わせが行われる。

【0019】このようにして、用紙が中間転写ベルト426と重ねられて、正電位につながれたコロナ放電器454の上を通過する。このとき、コロナ放電電流で用紙が正電荷で荷電され、トナー画像が用紙に転写される。続いて、コロナ放電器454の図上左側に配置された図示しない除電ブラシの箇所を通過するときに用紙は除電され、中間転写ベルト426から剥離して紙搬送ベルト472に移る。中間転写ベルト426から4色重ねトナー像を一括転写された用紙は、紙搬送ベルト472によりベルト定着方式の定着装置1へ搬送され、この定着装置1で熱と圧力によりトナー像を定着される。定着を終えた用紙は排出ローラ対480で機外へ排出され、図示しないトレイにスタックされる。これにより、フルカラーコピーが得られる。

【0020】次に、ベルト定着方式の定着装置1について詳細に説明する。図1に示すように、定着装置1は、定着ローラ4と、内部に熱源としてのハロゲンヒータ6を有する加熱ローラ3と、定着ローラ4と加熱ローラ3間に張架された定着ベルト2と、定着ローラ4に対向して配置され、定着ベルト2を挟んで該定着ローラ4に圧縮スプリング8の付勢力により圧接された加圧ローラ5と、加熱ローラ3側の定着ベルト2の温度を検知するサーミスタ7等を有している。加圧ローラ5の内部にも加熱ローラ3と同様にハロゲンヒータ6が設けられている。

【0021】加圧ローラ5の回転軸には図示しないギヤが固定されており、このギヤには図示しない駆動源の駆動ギヤが噛み合っている。回転駆動は定着ローラ4に掛ける構成としてもよい。また、加圧ローラ5と定着ローラ4をギヤで連結して噛み合わせることににより、加圧ローラ5と定着ローラ4の双方に回転駆動を掛ける構成としてもよい。加熱ローラ3は、図示しない側板に設けられた図示しない軸受によって回転自在に保持されている。

【0022】定着ベルト2にテンションを付与するために、加熱ローラ3は図示しないスプリングにより、該加熱ローラ3を定着ローラ4から離間する方向に引っ張り荷重2〜6kgfで付勢されている。加熱ローラ3は、厚みが0.6mmで外径が30mmのアルミニウム製のパイプで形成されている。定着ローラ4と接触している定着ベルト2の外周面にサーミスタ7が配置されてお

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り、定着ベルト2の温度を検知している。定着ローラ4は、外径が40mmで、鉄製の芯金の外周に液状シリコン又は発泡シリコンによる弾性層4aが2~6mmの厚さで形成されており、回転自在に支持されている。定着ローラ4の表面硬度はアスカC軸上硬度で、10~50Hsである。

【0023】加圧ローラ5は、圧縮スプリング8により定着ローラ4に圧接する向きに40~80kgfの荷重で押圧されている。加圧ローラ5は少なくとも定着ローラ4に当接することによりニップ部が形成されるように圧接されている。加圧ローラ5は外径30~40mmで、アルミニウム製の芯金（厚み0.8mm）の外周にシリコンゴムからなる弾性層とフッ素樹脂層とによる表面層を設けた構成を有している。定着ベルト2は、厚みが50μmのポリイミド製の基材と、該基材の上に設けられた弾性層としてのシリコンゴム層（厚み100μm）と、該シリコンゴム層の上に設けられた表面離型層としてのPFA、FEP、PTFE等の層（厚さ20μm）で構成されている。定着ベルト2の外径は60mmである。また、トナーは、少なくとも結着樹脂と着色剤とワックスを含有している。

【0024】トナー12を担持した記録材としての用紙11は図中右側へ搬送され、ニップ部へ進入する。ニップ部通過時に、加熱、加圧され、トナー12が溶融定着される。本実施形態においては、表面硬度の低い定着ローラ4を使用することで、定着ローラ4への加圧ローラ5の食い込み量を大きくし、ニップ部の出口形状の定着ローラ4の曲率半径を小さくできるようにした上で、定\*

\*着ベルト2は、上述のように基材、弾性層共に薄く形成して曲げ剛性の低いものとしている。これにより、図2に示すように、ニップ部出口での定着ベルト2と加圧ローラ5が離れる点における定着ベルト2の曲率半径を例えば5mm以下のレベルとすることが可能である。定着ベルト2が薄く曲げ剛性が低い場合には、定着ベルト2はニップ部の出口の定着ローラ4の形状に倣うため、ニップ部の出口の曲率半径Rは小さくなる。

【0025】定着ベルト2の曲率半径が小さい場合には、用紙11がニップ部を出てきたところで、用紙11が大きく曲げられることになるため、用紙11のコシにより分離することが容易となる。この場合、オイルの塗布がなくても用紙11のコシにより定着ベルト2への用紙11の巻き付きやトナーオフセットなどの問題を来すことなく用紙11を分離することができる。定着ベルト2の基材の厚さと、定着ローラ4の表面硬度、ニップ部出口での定着ベルト2の曲率半径を変えた場合における用紙11の定着ベルト2への巻き付き状態の実験結果を表1に示す。但し、用紙11は大王製紙社製T-6200（坪量67g/m<sup>2</sup>、厚さ90μm、密度0.78g/cm<sup>3</sup>、at23℃30%）を使用し、定着ベルト2の温度は画像光沢度（日本電色社製の光沢度計PG-1にて測定）が一定（15%）となる温度に合わせてある。表1において、数字10/50は、50枚の通紙で巻き付き発生が10枚であることを表している。

【0026】

【表1】

	本実施例	比較例1	比較例2
定着ローラ表面硬度 (アスカC軸上)	25Hs	25Hs	60Hs
ベルト構成	ポリイミド50μm シリコン100μm FEP20μm	ポリイミド120μm シリコン100μm FEP20μm	ポリイミド120μm シリコン100μm FEP20μm
ニップ出口でのベルト 曲率半径	4.5mm	7.5mm	9.0mm
記録材11の巻き付き 先端余白12mm	○ 0/50	○ 0/50	△ 4/50
記録材11の巻き付き 先端余白6mm	○ 0/50	× 21/50	× 45/50
記録材11の巻き付き 先端余白3mm	○ 0/50	× 50/50	× 50/50

【0027】表1から、ニップ部出口での定着ベルト2の曲率半径が大体5mm以下程度であれば、用紙11の巻き付きをほぼ完璧に防止できることが判る。

【0028】次に、図4に基づいて他の実施形態を説明する。なお、上記実施形態と同一部分は同一符号で示し、特に必要がない限り既にした構成上及び機能上の説明は省略する（以下の他の実施形態において同じ）。本実施形態における定着ベルト20は、厚みが100μm※50

※のポリイミド製の基材と、該基材の上に設けられた弾性層としてのシリコンゴム層（厚み200μm）と、該シリコンゴム層の上に設けられた表面離型層としてのPFA、FEP、PTFE等の層（厚さ20μm）で構成されている。定着ベルト20の外径は60mmである。すなわち、上記実施形態における定着ベルト2よりも厚みを大きくしている。

【0029】ニップ部の出口近傍に定着ベルト20に当接する分離補助部材9が設けられており、該分離補助部



材9はスプリング10にて4等10kgfの荷重で押圧されている。この分離補助部材9によってニップ部の出口近傍の定着ベルト20の曲率半径を小さくしており、基材及び弾性層を厚くした定着ベルト20においても、用紙11の巻き付きなしに分離することが可能となっている。分離補助部材9は、表面に耐熱性のシリコンゴムが被覆されたローラであり、定着ベルト20に従動回転するように支持されている。分離補助部材9は、表面にPFA、FEP、PTFEなどの耐熱性で摩擦係数の小さなフッ素樹脂を被覆し、定着ベルト20と摺動するように押圧してもよい。

【0030】図5は、本実施形態におけるニップ部の出口の拡大図である。分離補助部材9を押圧して定着ローラ4の弾性層を歪ませることにより、ニップ部の出口での定着ベルト20の曲率半径を局所的に小さくしている。ニップ部の出口の曲率半径Rが小さいために、用紙11のコシによる分離性を向上させることができる。なお、図5においてはスプリング10は省略している。

【0031】次に、図6に基づいて他の実施形態を説明する。本実施形態では、分離補助部材9が定着ベルト20の回転方向に対して負荷を掛けて該定着ベルト20を弛ませるように設けられている。具体的には例えば分離補助部材9の線速を定着ベルト20の線速より小さくする。かかる構成によって該定着ベルト20の曲率半径を小さくしている。本実施形態においても、ニップ部の出口の曲率半径Rが小さいために、用紙11のコシによる分離性を向上させることができる。

【0032】

【発明の効果】請求項1又は7記載の発明によれば、定着ローラの表面硬度を低くして該定着ローラへの加圧ローラの食い込み量を大きくし、且つ、定着ベルトの厚みを小さくして該定着ベルトの曲げ弾性を低くし、ニップ部の出口における該定着ベルトの曲率半径を小さくした構成としたので、記録材のコシを有効に活用することができ、分離爪の設置やオイルの塗布を行うことなしに記録材を分離することができ、装置のコストダウン、定着ベルトの長寿命化、装置のメンテナンス性の向上を図ることができる。

【0033】請求項2又は7記載の発明によれば、ニップ部の出口近傍で定着ベルトに当接する分離補助部材を有し、該分離補助部材によって該ニップ部の出口近傍における定着ベルトの曲率半径を局所的に小さくした構成としたので、オイル塗布を必要としない3層構造の厚い定着ベルト、換言すれば、分離性の悪い定着ベルトにおいても、定着ベルトへの記録材の巻き付きやトナーオフセットを抑制しながら記録材を分離できる。

【0034】請求項3又は7記載の発明によれば、分離

補助部材が、定着ベルトに従動して回転するローラである構成としたので、定着ベルトの曲率半径を局所的に小さくすることを容易に行える。

【0035】請求項4又は7記載の発明によれば、分離補助部材が定着ローラの弾性層を圧力により歪ませることにより定着ベルトの曲率半径を小さくしている構成としたので、分離性の悪い定着ベルトにおいても、定着ベルトへの記録材の巻き付きやトナーオフセットを抑制しながら記録材を分離できる。

10 【0036】請求項5又は7記載の発明によれば、分離補助部材が定着ベルトの回転方向に対して負荷を掛けて該定着ベルトを弛ませることにより該定着ベルトの曲率半径を小さくしている構成としたので、分離性の悪い定着ベルトにおいても、定着ベルトへの記録材の巻き付きやトナーオフセットを抑制しながら記録材を分離できる。

【0037】請求項6又は7記載の発明によれば、トナーが少なくとも結着樹脂と着色剤とワックスを含有し、定着ベルトは少なくとも基材と弾性層と表面離型層の3層構造を有している構成としたので、トナーによるホットオフセット防止効果を得ることができ、分離性の悪い定着ベルトにおいても、定着ベルトへの記録材の巻き付きやトナーオフセットを抑制しながら記録材を分離できる。

【図面の簡単な説明】

【図1】本発明の一実施形態に係る定着装置の概要正面図である。

【図2】ニップ部周辺の拡大正面図である。

30 【図3】画像形成装置としてのカラー複写機の概要正面図である。

【図4】他の実施形態における定着装置の概要正面図である。

【図5】図4で示した定着装置のニップ部周辺の拡大正面図である。

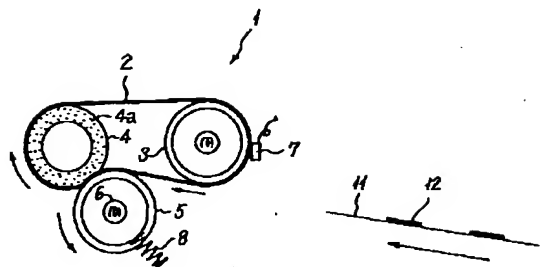
【図6】他の実施形態におけるニップ部周辺の拡大正面図である。

【図7】従来におけるニップ部周辺の拡大正面図である。

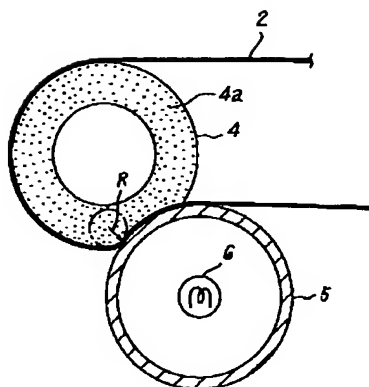
【符号の説明】

- 40 2 定着ベルト
- 3 加熱ローラ
- 4 定着ローラ
- 5 加圧ローラ
- 6 熱源としてのハロゲンヒータ
- 9 分離補助部材
- 402 像担持体としての感光体
- 422 現像手段としての回転式現像装置

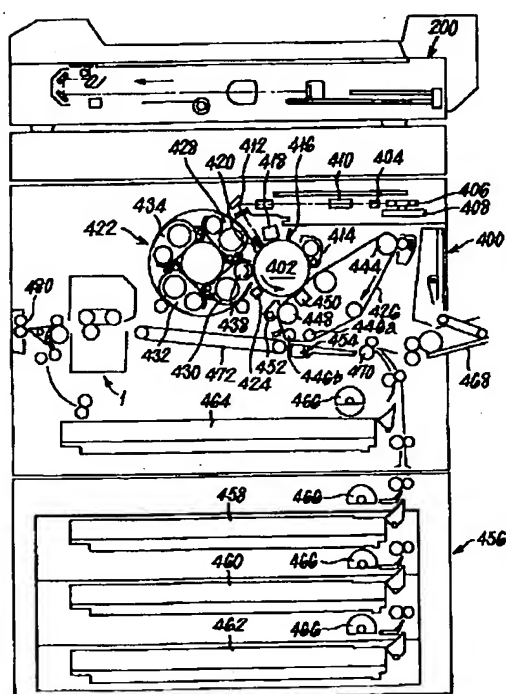
【図1】



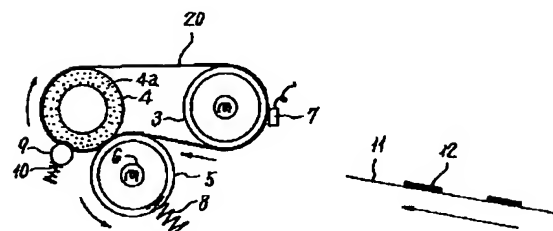
【図2】



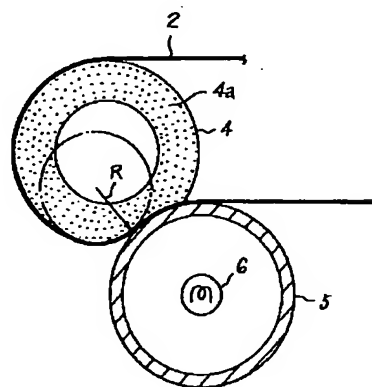
【図3】



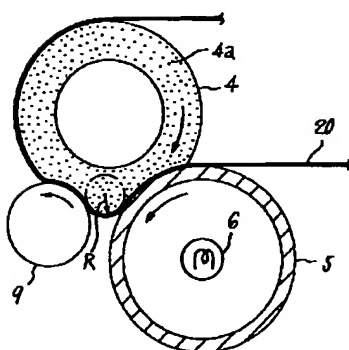
【図4】



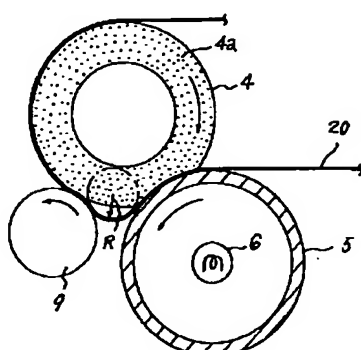
【図7】



【図5】



【図6】



## フロントページの続き

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CLAIMS

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[Claim(s)]

[Claim 1] The fixing roller which has an elastic layer on a front face, and the heating roller which has a heat source inside, It has this fixing roller, the fixing belt of the shape of endless [ which was laid between heating rollers ], and the pressurization roller that this fixing roller is countered, and it is prepared and carries out a pressure welding to this fixing roller through this fixing belt. In the anchorage device which heats the non-established toner image currently supported with the nip section formed with this fixing belt and a pressurization roller on record material, and is pressurized Make low surface hardness of the above-mentioned fixing roller, and the amount of interlocking of the above-mentioned pressurization roller to this fixing roller is enlarged. And the anchorage device characterized by having made thickness of the above-mentioned fixing belt small, having made bending elasticity of this fixing belt low, and making small the radius of curvature of this fixing belt in the outlet of the above-mentioned nip section.

[Claim 2] The fixing roller which has an elastic layer on a front face, and the heating roller which has a heat source inside, It has this fixing roller, the fixing belt of the shape of endless [ which was laid between heating rollers ], and the pressurization roller that this fixing roller is countered, and it is prepared and carries out a pressure welding to this fixing roller through this fixing belt. In the anchorage device which heats the non-established toner image currently supported with the nip section formed with this fixing belt and a pressurization roller on record material, and is pressurized The anchorage device characterized by having the separation auxiliary member which contacts the above-mentioned fixing belt near the outlet of the above-mentioned nip section, and making small locally the radius of curvature of the above-mentioned fixing belt [ / near the outlet of this nip section ] by this separation auxiliary member.

[Claim 3] The anchorage device with which the above-mentioned separation auxiliary member is characterized by being the roller which follows and rotates to the above-mentioned fixing belt in an anchorage device according to claim 2.

[Claim 4] The anchorage device characterized by making small the radius of curvature of the above-mentioned fixing belt in an anchorage device according to claim 2 when the above-mentioned separation auxiliary member makes the elastic layer of the above-mentioned fixing roller distorted with a pressure.

[Claim 5] The anchorage device characterized by making small the radius of curvature of this fixing belt when the above-mentioned separation auxiliary member hangs a load to the hand of cut of the above-mentioned fixing belt and slacks this fixing belt in an anchorage device according to claim 2.

[Claim 6] It is the anchorage device which a toner contains binding resin, a coloring agent, and a wax at least in claim 1 thru/or the anchorage device of one of 5 publications, and is characterized by the above-mentioned fixing belt having the three-tiered structure of a base material, an elastic layer, and a surface mold release layer at least.

[Claim 7] Image formation equipment which carries out visible image good [ of the electrostatic latent image formed in image support ] as a toner image with a development means, and is characterized by for the above-mentioned anchorage devices to be claim 1 thru/or the thing of one of 6 publications in the image formation equipment fixed to the anchorage device of a belt fixing method through the record material which imprinted this toner image to record material, and held this toner image.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to image formation equipments, such as a copying machine equipped with the anchorage device of the belt fixing method for a non-established image being established, and this anchorage device, a printer, and facsimile.

[0002]

[Description of the Prior Art] With this kind of image formation equipment, the electrostatic latent image based on the image information of a manuscript image is formed, for example on the photo conductor as image support, this electrostatic latent image is used as a toner image with a development means, and this toner image is imprinted electrostatic on the form as record material. The form which had the toner image imprinted is sent to an anchorage device, and melting and fixing of a toner image are done by heat and the pressure here at a form. A fixing belt is laid between a fixing roller and the heating roller which has the heat source of a halogen heater etc. inside, and the anchorage device of a belt fixing method has the configuration which carries out the pressure welding of the heating roller which countered the fixing roller and has been arranged to this fixing roller on both sides of this fixing belt as indicated by JP,10-307496,A. Fixing is made by letting the form which supported the toner image in the nip section formed between a fixing belt and a heating roller pass. By carrying out accumulation to a belt with small heat capacity, and being fixed to it, build up time is aiming at the so-called prevention of the toner offset which a toner transfers to a fixing belt with the nip configuration which fixing by low temperature is possible and serves as a convex with large nip width of face early in the upper part.

[0003] By the way, in the anchorage device of a belt fixing method, there is a problem that the form other than toner offset coils around a fixing belt at the outlet of the nip section, and separation is not made good. That this problem should be coped with, the nip section used as a convex is formed in a fixing roller side, and the configuration of the cross direction (the form conveyance direction) of the nip section which formed in the outlet side edge at least a part for the variant part of the large namely, convex configuration of the image contact surface where curvature is large is indicated by JP,2000-206815,A at the pressure-welding section of a fixing roller and a pressurization roller. Although it is not a belt fixing method, the configuration which established the deflection means forming which dents a thin wall tube near the conveyance direction downstream of imprint material to the nip section of a thin wall tube and a rubber roller, and forms the deflection of the radius of curvature  $r$  smaller than the radius of curvature  $R$  of the thin wall tube that separation should be made good is indicated by JP,7-92837,A.

[0004]

[Problem(s) to be Solved by the Invention] In the anchorage device of a belt fixing method, in order to prevent toner offset without oil spreading, it is necessary to form fluororesins, such as PFA, FEP, PTFE, etc. excellent in the mold-release characteristic, in a fixing hair side of belt layer. Moreover, in order to obtain the uniform image which reduced the crepe-like gloss nonuniformity on the image after fixing, if a 100-300-micrometer elastic layer is required for the bottom of a surface and a base material is included, it will become the lamination of at least three or more layers. Since the fixing belt of such 3 lamination has high flexural rigidity, as it is shown in drawing 7, in order to make a fixing roller distorted at the outlet of the nip section, namely, not to imitate the configuration of a fixing roller, the radius of curvature  $R$  of the configuration of the outlet of the nip section will become large inevitably. In this case, in order to dissociate without bending a form, the chewiness of a form was not utilized enough, but separability fell, and there was a problem which generating of toner offset, coiling round of the form to a fixing belt, etc. generate. In drawing 7, the pressurization roller with which a sign 4 has a fixing roller inside and a sign 5 has a halogen heater 6, and the sign 2 show the fixing belt.

[0005] Although elasticity is required for a fixing belt in order to acquire uniform gloss, and the lamination of a fixing belt will become thick inevitably with the technique indicated by JP,2000-206815,A, in that case, the radius of curvature of the outlet of the nip section becomes large, and separation by the chewiness of a form becomes difficult. With the technique of a publication, the metal tube of 0.08 thru/or 0.25mm thin meat is used for JP,7-92837,A as a fixing roller. The nip section is formed in the fixing roller of press of a pressurization roller, and a fixing roller rotates by the driving means. For that purpose, a certain amount of rigidity is needed for a fixing roller. It is very difficult to dent the fixing roller, so that curvature changes. Conversely, if it is the fixing roller which was rich in elasticity so that curvature changes, it will deform by press of a pressurization roller and nip width of face or a pressure required to establish a toner will not be obtained.

[0006] Then, this invention sets offer of the anchorage device which can separate record material certainly, and image formation equipment equipped with this as the purpose, without [ without it can make the radius of curvature of the separation section small, it can aim at improvement in separability ability, without covering a superfluous load over a fixing roller or a fixing belt and it forms oil spreading and a separation pawl, and ] reducing the endurance of a fixing roller etc. remarkably.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, in invention according to claim 1 The fixing roller which has an elastic layer on a front face, and the heating roller which has a heat source inside, It has this fixing roller, the fixing belt of the shape of endless [ which was laid between heating rollers ], and the pressurization roller that this fixing roller is countered, and it is prepared and carries out a pressure welding to this fixing roller through this fixing belt. In the anchorage device which heats the non-established toner image currently supported with the nip section formed with this fixing belt and a pressurization roller on record material, and is pressurized Make low surface hardness of the above-mentioned fixing roller, and the amount of interlocking of the above-mentioned pressurization roller to this fixing roller is enlarged. And the configuration of having made thickness of the above-mentioned fixing belt small, having made bending elasticity of this fixing belt low, and having made small the radius of curvature of this fixing belt in the outlet of the above-mentioned nip section is taken.

[0008] The fixing roller which has an elastic layer on a front face in invention according to claim 2, and the heating roller which has a heat source inside, It has this fixing roller, the fixing belt of the shape of endless [ which was laid between heating rollers ], and the pressurization roller that this fixing roller is countered, and it is prepared and carries out a pressure welding to this fixing roller through this fixing belt. In the anchorage device which heats the non-established toner image currently supported with the nip section formed with this fixing belt and a pressurization roller on record material, and is pressurized It had the separation auxiliary member which contacts the above-mentioned fixing belt near the outlet of the above-mentioned nip section, and the configuration of having made small locally the radius of curvature of the above-mentioned fixing belt [ / near the outlet of this nip section ] by this separation auxiliary member is taken.

[0009] In invention according to claim 3, the above-mentioned separation auxiliary member has taken the configuration that it is the roller which follows and rotates to the above-mentioned fixing belt, in the anchorage device according to claim 2.

[0010] In invention according to claim 4, the configuration that the above-mentioned separation auxiliary member makes small the radius of curvature of the above-mentioned fixing belt by making the elastic layer of the above-mentioned fixing roller distorted with a pressure is taken in the anchorage device according to claim 2.

[0011] In invention according to claim 5, the configuration that the above-mentioned separation auxiliary member makes small the radius of curvature of this fixing belt by hanging a load to the hand of cut of the above-mentioned fixing belt, and slacking this fixing belt is taken in the anchorage device according to claim 2.

[0012] In invention according to claim 6, in claim 1 thru/or the anchorage device of one of 5 publications, the toner contained binding resin, the coloring agent, and the wax at least, and the configuration that the above-mentioned fixing belt has the three-tiered structure of a base material, an elastic layer, and a surface mold release layer at least is taken.

[0013] In invention according to claim 7, visible image good [ of the electrostatic latent image formed in image support ] was carried out as a toner image with the development means, this toner image was imprinted to record material, and the configuration that the above-mentioned anchorage devices are claim 1 thru/or the thing of one of 6 publications is taken in the image formation equipment fixed to the anchorage device of a belt fixing method through the record material holding this toner image.

[0014]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained based on drawing 1 thru/or

drawing 3 . In addition, the same sign shows the same part as the conventional example. First, based on drawing 3 , the whole color copying machine configuration as image formation equipment and actuation are explained roughly. The write-in optical unit 400 as an exposure means changes the color picture data from a color scanner 200 into a lightwave signal, performs the optical writing corresponding to a manuscript image, and forms an electrostatic latent image on the photo conductor 402 which is image support. This write-in optical unit 400 is constituted by laser diode 404, the polygon mirror 406 and its motor 408 for rotation, the  $f/\theta$  lens 410, and the reflective mirror 412 grade. A photo conductor 402 rotates to the counterclockwise sense, as an arrow head shows, and in the perimeter, the development counter ( drawing 3 development counter 438) with which it was chosen of the photo conductor cleaning unit 414, the electric discharge lamp 416, the potential sensor 420, and the rotating type developers 422, the development concentration pattern detector 424, and the middle imprint belt 426 grade are arranged.

[0015] The rotating type developer 422 has the rotation mechanical component which rotates the development counter 428 for blacks, the development counter 430 for cyanogen, the development counter 432 for Magentas, the development counter 434 for yellow, and an angle development counter and which is not illustrated. Each development counter has the development sleeve which the ear of a developer is contacted on the front face of a photo conductor 402, and is rotated in order to form an electrostatic latent image into a visible image, the development paddle which rotates in order to pump up and stir a developer. In the state of standby, the rotating type developer 422 is set to the location of black development, if copy actuation is started, reading of the data of a black image will start from timing predetermined with a color scanner 200, and formation of the optical writing and the electrostatic latent image by the laser beam (black latent image) will start based on this image data.

[0016] In order to develop negatives from the point of this black latent image, before a latent-image point arrives at the development location of the development counter 428 for blacks, rotation initiation of the development sleeve is carried out, and a black latent image is developed with a black toner. And although development actuation of a black latent-image field is continued henceforth, when the latent-image back end section passes through a black development location, the rotating type developer 422 rotates from the development location for black to the \*\*\*\* development location of a degree promptly. The actuation concerned is made to complete at least before the latent-image point by the following image data reaches. If an image formation cycle is started, as an arrow head shows, the middle imprint belt 426 will be first rotated for a photo conductor 402 by the counterclockwise sense with the drive motor which is not illustrated to the clockwise sense. With rotation of the middle imprint belt 426, black toner image formation, cyanogen toner image formation, Magenta toner image formation, and yellow toner image formation are performed, finally, in order of black (Bk), cyanogen (C), a Magenta (M), and yellow (Y), it piles up on the middle imprint belt 426, and a toner image is formed.

[0017] The middle imprint belt 426 is laid [ firmly ] across a driving roller 444, the imprint opposite rollers 446a and 446b, the cleaning opposite roller 448, and the follower roller group, and drive control is carried out with the drive motor which is not illustrated. Alignment of the black by which sequential formation is carried out, cyanogen, a Magenta, and each toner image of yellow is correctly carried out to a photo conductor 402 one by one on the middle imprint belt 426, and the belt transfer picture of 4 color piles is formed of this. The package imprint of this belt transfer picture is carried out by the imprint corona discharger 454 at record material (form).

[0018] The form of various different sizes from the size of the form held in the cassette 464 within the body of equipment is held in each recording paper cassettes 458, 460, and 462 in the feed bank 456, and the this specified form is fed [ paper ] to it and conveyed by the feed koro 466 in the resist roller pair 470 directions from the hold cassette of the specified size paper among these. In drawing 3 , a sign 468 shows the manual paper feed tray for an OHP form, pasteboard, etc. it feeds with a form from feed opening of the cassette of one of the above at the stage when image formation is started -- having -- a resist roller pair -- it stands by in the nip section of 470. and the tip of the toner image on the middle imprint belt 426 puts in the corona discharge machine 454, and a form tip is in agreement at this tip of an image exactly at this time -- as -- a resist roller pair -- 470 drives and resist doubling of a form and an image is performed.

[0019] Thus, a form piles up with the middle imprint belt 426, and passes through the corona discharge machine 454 top connected with forward potential. At this time, the electric charge of the form is carried out with positive charge with a corona discharge current, and a toner image is imprinted by the form. Then, when passing through the part of the electric discharge brush which has been arranged on the left-hand side of [ drawing top ] the corona discharge machine 454 and which is not illustrated, a form is discharged, exfoliates from the middle imprint belt 426, and moves to the paper conveyance belt 472. The form by which the package imprint was carried out in 4 color pile toner image from the middle imprint belt 426 is conveyed with the paper conveyance belt 472 to the anchorage device 1 of a belt fixing



method, and heat and a pressure are fixed to it in a toner image with this anchorage device 1. the form which finished fixing -- a discharge roller pair -- it is discharged by 480 outside the plane, and a stack is carried out to the tray which is not illustrated. Thereby, a full color copy is obtained.

[0020] Next, the anchorage device 1 of a belt fixing method is explained to a detail. The heating roller 3 with which an anchorage device 1 has the halogen heater 6 as a heat source in a fixing roller 4 and the interior as shown in drawing 1, A fixing roller 4, the fixing belt 2 laid between heating rollers 3, and the pressurization roller 5 in which countered the fixing roller 4, and have been arranged and the pressure welding was carried out to this fixing roller 4 by the energization force of compression Spring-8 on both sides of the fixing belt 2, It has the thermistor 7 grade which detects the temperature of the fixing belt 2 by the side of a heating roller 3. The halogen heater 6 as well as a heating roller 3 is formed also in the interior of the pressurization roller 5.

[0021] The gear which is not illustrated is being fixed to the revolving shaft of the pressurization roller 5, and the drive gear of the driving source which is not illustrated has geared on this gear. A rotation drive is good also as a configuration hung on a fixing roller 4. Moreover, it is good also as a configuration which hangs a rotation drive on the both sides of the pressurization roller 5 and a fixing roller 4 by connecting and engaging the pressurization roller 5 and a fixing roller 4 by the gear. The heating roller 3 is held free [ rotation ] by the bearing which was prepared in the side plate which is not illustrated and which is not illustrated.

[0022] In order to give a tension to the fixing belt 2, a heating roller 3 pulls this heating roller 3 with the spring which is not illustrated in the direction estranged from a fixing roller 4, and is energized by load 2-6kgf. The heating roller 3 is formed in the pipe made from aluminum whose outer diameter thickness is 30mm in 0.6mm. The thermistor 7 is arranged at the peripheral face of the fixing belt 2 in contact with a fixing roller 4, and the temperature of the fixing belt 2 is detected. An outer diameter is 40mm, elastic layer 4a by liquefied silicon or foaming silicon is formed in the periphery of iron rodding by the thickness which is 2-6mm, and the fixing roller 4 is supported free [ rotation ]. The surface hardness of a fixing roller 4 is the Aska C shaft top degree of hardness, and is 10-50Hs.

[0023] The pressurization roller 5 is pressed by the load of 40-80kgf by the sense which carries out a pressure welding to a fixing roller 4 by compression Spring-8. By contacting a fixing roller 4 at least, the pressure welding of the pressurization roller 5 is carried out so that the nip section may be formed. The pressurization roller 5 is 30-40mm in outer diameter, and has the configuration which prepared the surface layer by the elastic layer and fluoro-resin layer which become the periphery of rodding made from aluminum (thickness of 0.8mm) from silicone rubber. The fixing belt 2 consists of layers (20 micrometers in thickness) as the base material made from polyimide whose thickness is 50 micrometers, the silicone rubber layer (thickness of 100 micrometers) as an elastic layer prepared on this base material, and a surface mold release layer prepared on this silicone rubber layer, such as PFA, FEP, and PTFE. The outer diameter of the fixing belt 2 is 60mm. Moreover, the toner contains binding resin, the coloring agent, and the wax at least.

[0024] The form 11 as record material which supported the toner 12 is conveyed to a drawing Nakamigi side, and advances to the nip section. It is heated and pressurized at the time of nip section passage, and melting fixing of the toner 12 is carried out. In this operation gestalt, after enlarging the amount of interlocking of the pressurization roller 5 to a fixing roller 4 and being able to be made to make small the radius of curvature of the fixing roller 4 of the outlet configuration of the nip section by using the low fixing roller 4 of surface hardness, the fixing belt 2 form a base material and an elastic layer thinly as mentioned above, and be made into what have low flexural rigidity.



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EFFECT OF THE INVENTION

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[Effect of the Invention] According to invention according to claim 1 or 7, make surface hardness of a fixing roller low and the amount of interlocking of the pressurization roller to this fixing roller is enlarged. And since it is considered as the configuration which made thickness of a fixing belt small, made bending elasticity of this fixing belt low, and made small the radius of curvature of this fixing belt in the outlet of the nip section. The chewiness of record material is effectively utilizable, record material can be separated, without performing installation of a separation pawl, and spreading of oil, and improvement in the cost cut of equipment, the reinforcement of a fixing belt, and the maintenance nature of equipment can be aimed at.

[0033] Since it is considered as the configuration which has the separation auxiliary member which contacts a fixing belt near the outlet of the nip section, and made small locally the radius of curvature of a fixing belt [ / near the outlet of this nip section ] by this separation auxiliary member according to invention according to claim 2 or 7 the thick fixing belt of a three-tiered structure which does not need oil spreading -- if it puts in another way, also in the bad fixing belt of separability, record material is separable, controlling coiling round and toner offset of the record material to a fixing belt.

[0034] Since the separation auxiliary member is considered as the configuration which is the roller which follows and rotates to a fixing belt according to invention according to claim 3 or 7, things can be locally performed for the radius of curvature of a fixing belt easily small.

[0035] Since the separation auxiliary member is considered as the configuration which makes the radius of curvature of a fixing belt small by making the elastic layer of a fixing roller distorted with a pressure according to invention according to claim 4 or 7, also in the bad fixing belt of separability, record material is separable, controlling coiling round and toner offset of the record material to a fixing belt.

[0036] Since it is considered as the configuration which makes small the radius of curvature of this fixing belt when a separation auxiliary member hangs a load to the hand of cut of a fixing belt and slacks this fixing belt according to invention according to claim 5 or 7, also in the bad fixing belt of separability, record material is separable, controlling coiling round and toner offset of the record material to a fixing belt.

[0037] Since according to invention according to claim 6 or 7 the toner contained binding resin, the coloring agent, and the wax at least and the fixing belt was considered as the configuration which has the three-tiered structure of a base material, an elastic layer, and a surface mold release layer at least, the hot offset prevention effectiveness by the toner can be acquired, and also in the bad fixing belt of separability, record material is separable, controlling coiling round and toner offset of the record material to a fixing belt.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] In the anchorage device of a belt fixing method, in order to prevent toner offset without oil spreading, it is necessary to form fluororesins, such as PFA, FEP, PTFE, etc. excellent in the mold-release characteristic, in a fixing hair side of belt layer. Moreover, in order to obtain the uniform image which reduced the crepe-like gloss nonuniformity on the image after fixing, if a 100-300-micrometer elastic layer is required for the bottom of a surface and a base material is included, it will become the lamination of at least three or more layers. Since the fixing belt of such 3 lamination has high flexural rigidity, as it is shown in drawing 7, in order to make a fixing roller distorted at the outlet of the nip section, namely, not to imitate the configuration of a fixing roller, the radius of curvature R of the configuration of the outlet of the nip section will become large inevitably. In this case, in order to dissociate without bending a form, the chewiness of a form was not utilized enough, but separability fell, and there was a problem which generating of toner offset, coiling round of the form to a fixing belt, etc. generate. In drawing 7, the pressurization roller with which a sign 4 has a fixing roller inside and a sign 5 has a halogen heater 6, and the sign 2 show the fixing belt.

[0005] Although elasticity is required for a fixing belt in order to acquire uniform gloss, and the lamination of a fixing belt will become thick inevitably with the technique indicated by JP,2000-206815,A, in that case, the radius of curvature of the outlet of the nip section becomes large, and separation by the chewiness of a form becomes difficult. With the technique of a publication, the metal tube of 0.08 thru/or 0.25mm thin meat is used for JP,7-92837,A as a fixing roller. The nip section is formed in the fixing roller of press of a pressurization roller, and a fixing roller rotates by the driving means. For that purpose, a certain amount of rigidity is needed for a fixing roller. It is very difficult to dent the fixing roller, so that curvature changes. Conversely, if it is the fixing roller which was rich in elasticity so that curvature changes, it will deform by press of a pressurization roller and nip width of face or a pressure required to establish a toner will not be obtained.

[0006] Then, this invention sets offer of the anchorage device which can separate record material certainly, and image formation equipment equipped with this as the purpose, without [ without it can make the radius of curvature of the separation section small, it can aim at improvement in separability ability, without covering a superfluous load over a fixing roller or a fixing belt and it forms oil spreading and a separation pawl, and ] reducing the endurance of a fixing roller etc. remarkably.

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MEANS

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[Means for Solving the Problem] In order to attain the above-mentioned purpose, in invention according to claim 1 The fixing roller which has an elastic layer on a front face, and the heating roller which has a heat source inside, It has this fixing roller, the fixing belt of the shape of endless [ which was laid between heating rollers ], and the pressurization roller that this fixing roller is countered, and it is prepared and carries out a pressure welding to this fixing roller through this fixing belt. In the anchorage device which heats the non-established toner image currently supported with the nip section formed with this fixing belt and a pressurization roller on record material, and is pressurized Make low surface hardness of the above-mentioned fixing roller, and the amount of interlocking of the above-mentioned pressurization roller to this fixing roller is enlarged. And the configuration of having made thickness of the above-mentioned fixing belt small, having made bending elasticity of this fixing belt low, and having made small the radius of curvature of this fixing belt in the outlet of the above-mentioned nip section is taken.

[0008] The fixing roller which has an elastic layer on a front face in invention according to claim 2, and the heating roller which has a heat source inside, It has this fixing roller, the fixing belt of the shape of endless [ which was laid between heating rollers ], and the pressurization roller that this fixing roller is countered, and it is prepared and carries out a pressure welding to this fixing roller through this fixing belt. In the anchorage device which heats the non-established toner image currently supported with the nip section formed with this fixing belt and a pressurization roller on record material, and is pressurized It had the separation auxiliary member which contacts the above-mentioned fixing belt near the outlet of the above-mentioned nip section, and the configuration of having made small locally the radius of curvature of the above-mentioned fixing belt [ / near the outlet of this nip section ] by this separation auxiliary member is taken.

[0009] In invention according to claim 3, the above-mentioned separation auxiliary member has taken the configuration that it is the roller which follows and rotates to the above-mentioned fixing belt, in the anchorage device according to claim 2.

[0010] In invention according to claim 4, the configuration that the above-mentioned separation auxiliary member makes small the radius of curvature of the above-mentioned fixing belt by making the elastic layer of the above-mentioned fixing roller distorted with a pressure is taken in the anchorage device according to claim 2.

[0011] In invention according to claim 5, the configuration that the above-mentioned separation auxiliary member makes small the radius of curvature of this fixing belt by hanging a load to the hand of cut of the above-mentioned fixing belt, and slacking this fixing belt is taken in the anchorage device according to claim 2.

[0012] In invention according to claim 6, in claim 1 thru/or the anchorage device of one of 5 publications, the toner contained binding resin, the coloring agent, and the wax at least, and the configuration that the above-mentioned fixing belt has the three-tiered structure of a base material, an elastic layer, and a surface mold release layer at least is taken.

[0013] In invention according to claim 7, visible image good [ of the electrostatic latent image formed in image support ] was carried out as a toner image with the development means, this toner image was imprinted to record material, and the configuration that the above-mentioned anchorage devices are claim 1 thru/or the thing of one of 6 publications is taken in the image formation equipment fixed to the anchorage device of a belt fixing method through the record material holding this toner image.

[0014]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained based on drawing 1 thru/or drawing 3 . In addition, the same sign shows the same part as the conventional example. First, based on drawing 3 , the whole color copying machine configuration as image formation equipment and actuation are explained roughly. The write-in optical unit 400 as an exposure means changes the color picture data from a color scanner 200 into a lightwave signal, performs the optical writing corresponding to a manuscript image, and forms an electrostatic latent image on the

photo conductor 402 which is image support. This write-in optical unit 400 is constituted by laser diode 404, the polygon mirror 406 and its motor 408 for rotation, the f/theta lens 410, and the reflective mirror 412 grade. A photo conductor 402 rotates to the counterclockwise sense, as an arrow head shows, and in the perimeter, the development counter ( drawing 3 development counter 438) with which it was chosen of the photo conductor cleaning unit 414, the electric discharge lamp 416, the potential sensor 420, and the rotating type developers 422, the development concentration pattern detector 424, and the middle imprint belt 426 grade are arranged.

[0015] The rotating type developer 422 has the rotation mechanical component which rotates the development counter 428 for blacks, the development counter 430 for cyanogen, the development counter 432 for Magentas, the development counter 434 for yellow, and an angle development counter and which is not illustrated. Each development counter has the development sleeve which the ear of a developer is contacted on the front face of a photo conductor 402, and is rotated in order to form an electrostatic latent image into a visible image, the development paddle which rotates in order to pump up and stir a developer. In the state of standby, the rotating type developer 422 is set to the location of black development, if copy actuation is started, reading of the data of a black image will start from timing predetermined with a color scanner 200, and formation of the optical writing and the electrostatic latent image by the laser beam (black latent image) will start based on this image data.

[0016] In order to develop negatives from the point of this black latent image, before a latent-image point arrives at the development location of the development counter 428 for blacks, rotation initiation of the development sleeve is carried out, and a black latent image is developed with a black toner. And although development actuation of a black latent-image field is continued henceforth, when the latent-image back end section passes through a black development location, the rotating type developer 422 rotates from the development location for black to the \*\*\*\* development location of a degree promptly. The actuation concerned is made to complete at least before the latent-image point by the following image data reaches. If an image formation cycle is started, as an arrow head shows, the middle imprint belt 426 will be first rotated for a photo conductor 402 by the counterclockwise sense with the drive motor which is not illustrated to the clockwise sense. With rotation of the middle imprint belt 426, black toner image formation, cyanogen toner image formation, Magenta toner image formation, and yellow toner image formation are performed, finally, in order of black (Bk), cyanogen (C), a Magenta (M), and yellow (Y), it piles up on the middle imprint belt 426, and a toner image is formed.

[0017] The middle imprint belt 426 is laid [ firmly ] across a driving roller 444, the imprint opposite rollers 446a and 446b, the cleaning opposite roller 448, and the follower roller group, and drive control is carried out with the drive motor which is not illustrated. Alignment of the black by which sequential formation is carried out, cyanogen, a Magenta, and each toner image of yellow is correctly carried out to a photo conductor 402 one by one on the middle imprint belt 426, and the belt transfer picture of 4 color piles is formed of this. The package imprint of this belt transfer picture is carried out by the imprint corona discharger 454 at record material (form).

[0018] The form of various different sizes from the size of the form held in the cassette 464 within the body of equipment is held in each recording paper cassettes 458, 460, and 462 in the feed bank 456, and the this specified form is fed [ paper ] to it and conveyed by the feed koro 466 in the resist roller pair 470 directions from the hold cassette of the specified size paper among these. In drawing 3 , a sign 468 shows the manual paper feed tray for an OHP form, pasteboard, etc. it feeds with a form from feed opening of the cassette of one of the above at the stage when image formation is started -- having -- a resist roller pair -- it stands by in the nip section of 470. and the tip of the toner image on the middle imprint belt 426 puts in the corona discharge machine 454, and a form tip is in agreement at this tip of an image exactly at this time -- as -- a resist roller pair -- 470 drives and resist doubling of a form and an image is performed.

[0019] Thus, a form piles up with the middle imprint belt 426, and passes through the corona discharge machine 454 top connected with forward potential. At this time, the electric charge of the form is carried out with positive charge with a corona discharge current, and a toner image is imprinted by the form. Then, when passing through the part of the electric discharge brush which has been arranged on the left-hand side of [ drawing top ] the corona discharge machine 454 and which is not illustrated, a form is discharged, exfoliates from the middle imprint belt 426, and moves to the paper conveyance belt 472. The form by which the package imprint was carried out in 4 color pile toner image from the middle imprint belt 426 is conveyed with the paper conveyance belt 472 to the anchorage device 1 of a belt fixing method, and heat and a pressure are fixed to it in a toner image with this anchorage device 1. the form which finished fixing -- a discharge roller pair -- it is discharged by 480 outside the plane, and a stack is carried out to the tray which is not illustrated. Thereby, a full color copy is obtained.

[0020] Next, the anchorage device 1 of a belt fixing method is explained to a detail. The heating roller 3 with which an

anchorage device 1 has the halogen heater 6 as a heat source in a fixing roller 4 and the interior as shown in drawing 1 , A fixing roller 4, the fixing belt 2 laid between heating rollers 3, and the pressurization roller 5 in which countered the fixing roller 4, and have been arranged and the pressure welding was carried out to this fixing roller 4 by the energization force of compression Spring-8 on both sides of the fixing belt 2, It has the thermistor 7 grade which detects the temperature of the fixing belt 2 by the side of a heating roller 3. The halogen heater 6 as well as a heating roller 3 is formed also in the interior of the pressurization roller 5.

[0021] The gear which is not illustrated is being fixed to the revolving shaft of the pressurization roller 5, and the drive gear of the driving source which is not illustrated has geared on this gear. A rotation drive is good also as a configuration hung on a fixing roller 4. Moreover, it is good also as a configuration which hangs a rotation drive on the both sides of the pressurization roller 5 and a fixing roller 4 by connecting and engaging the pressurization roller 5 and a fixing roller 4 by the gear. The heating roller 3 is held free [ rotation ] by the bearing which was prepared in the side plate which is not illustrated and which is not illustrated.

[0022] In order to give a tension to the fixing belt 2, a heating roller 3 pulls this heating roller 3 with the spring which is not illustrated in the direction estranged from a fixing roller 4, and is energized by load 2-6kgf. The heating roller 3 is formed in the pipe made from aluminum whose outer diameter thickness is 30mm in 0.6mm. The thermistor 7 is arranged at the peripheral face of the fixing belt 2 in contact with a fixing roller 4, and the temperature of the fixing belt 2 is detected. An outer diameter is 40mm, elastic layer 4a by liquefied silicon or foaming silicon is formed in the periphery of iron rodding by the thickness which is 2-6mm, and the fixing roller 4 is supported free [ rotation ]. The surface hardness of a fixing roller 4 is the Aska C shaft top degree of hardness, and is 10-50Hs.

[0023] The pressurization roller 5 is pressed by the load of 40-80kgf by the sense which carries out a pressure welding to a fixing roller 4 by compression Spring-8. By contacting a fixing roller 4 at least, the pressure welding of the pressurization roller 5 is carried out so that the nip section may be formed. The pressurization roller 5 is 30-40mm in outer diameter, and has the configuration which prepared the surface layer by the elastic layer and fluororesin layer which become the periphery of rodding made from aluminum (thickness of 0.8mm) from silicone rubber. The fixing belt 2 consists of layers (20 micrometers in thickness) as the base material made from polyimide whose thickness is 50 micrometers, the silicone rubber layer (thickness of 100 micrometers) as an elastic layer prepared on this base material, and a surface mold release layer prepared on this silicone rubber layer, such as PFA, FEP, and PTFE. The outer diameter of the fixing belt 2 is 60mm. Moreover, the toner contains binding resin, the coloring agent, and the wax at least.

[0024] The form 11 as record material which supported the toner 12 is conveyed to a drawing Nakamigi side, and advances to the nip section. It is heated and pressurized at the time of nip section passage, and melting fixing of the toner 12 is carried out. In this operation gestalt, after enlarging the amount of interlocking of the pressurization roller 5 to a fixing roller 4 and being able to be made to make small the radius of curvature of the fixing roller 4 of the outlet configuration of the nip section by using the low fixing roller 4 of surface hardness, the fixing belt 2 form a base material and an elastic layer thinly as mentioned above, and be make into what have low flexural rigidity. It is possible to make into the level of 5mm or less by this, the radius of curvature of the fixing belt 2 in a nip section outlet and the fixing belt 2 in the point which leaves the pressurization roller 5, as shown in drawing 2 . When [ that the fixing belt 2 is thin ] flexural rigidity is low, in order that the fixing belt 2 may imitate the configuration of the fixing roller 4 of the outlet of the nip section, the radius of curvature R of the outlet of the nip section becomes small.

[0025] Since a form 11 will be greatly bent in the place to which the form 11 came out of the nip section when the radius of curvature of the fixing belt 2 is small, dissociating by the chewiness of a form 11 becomes easy. In this case, a form 11 can be separated, without causing problems, such as coiling round of the form 11 to the fixing belt 2, and toner offset, by the chewiness of a form 11, even if there is no spreading of oil. The experimental result of the coiling-round condition to the fixing belt 2 of the form 11 at the time of changing the thickness of the base material of the fixing belt 2 and the radius of curvature of the surface hardness of a fixing roller 4 and the fixing belt 2 in a nip section outlet is shown in Table 1. However, a form 11 uses the Daio Paper Corp. make T-6200 (micrometers [ in basis-weight 67 g/m2 and thickness / 90 ], consistency 0.78 g/cm [ 3 ], at23 degree-C30%), and the temperature of the fixing belt 2 is doubled with the temperature to which image glossiness (it measures in glossmeter PG-1 by Nippon Denshoku Co., Ltd.) is fixed (15%). In Table 1, figures 10/50 coil by \*\*\*\* of 50 sheets, and express that generating is ten sheets.

[0026]

[Table 1]

	本実施例	比較例1	比較例2
定着ローラ表面硬度 (アスカC軸上)	25Hs	25Hs	60Hs
ベルト構成	ポリイミド50 $\mu$ m シリコン100 $\mu$ m FEP20 $\mu$ m	ポリイミド120 $\mu$ m シリコン100 $\mu$ m FEP20 $\mu$ m	ポリイミド120 $\mu$ m  シリコン100 $\mu$ m FEP20 $\mu$ m
ニップ出口でのベルト 曲率半径	4.5mm	7.5mm	9.0mm
記録材11の巻き付き 先端余白12mm	○ 0/50	○ 0/50	△ 4/50
記録材11の巻き付き 先端余白6mm	○ 0/50	× 21/50	× 45/50
記録材11の巻き付き 先端余白3mm	○ 0/50	× 50/50	× 50/50

[0027] Table 1 shows that coiling round of a form 11 can be prevented nearly perfectly, if the radius of curvature of the fixing belt 2 in a nip section outlet is 5mm or less extent generally.

[0028] Next, other operation gestalten are explained based on drawing 4 . In addition, the same sign shows the same part as the above-mentioned operation gestalt, and as long as there is especially no need, the explanation on the configuration already carried out and a function is omitted (in other following operation gestalten, it is the same). The fixing belt 20 in this operation gestalt consists of layers (20 micrometers in thickness) as the base material made from polyimide whose thickness is 100 micrometers, the silicone rubber layer (thickness of 200 micrometers) as an elastic layer prepared on this base material, and a surface mold release layer prepared on this silicone rubber layer, such as PFA, FEP, and PTFE. The outer diameter of the fixing belt 20 is 60mm. That is, thickness is made larger than the fixing belt 2 in the above-mentioned operation gestalt.

[0029] the separation auxiliary member 9 which contacts the fixing belt 20 near the outlet of the nip section is formed, and boil this separation auxiliary member 9 spring 10 -- \*\* 4 grade -- it is pressed by the load of 10kgf(s). Also in the fixing belt 20 which makes small the radius of curvature of the fixing belt 20 near the outlet of the nip section by this separation auxiliary member 9, and thickened the base material and the elastic layer, dissociating without coiling round of a form 11 is possible. The separation auxiliary member 9 is the roller with which heat-resistant silicone rubber was covered by the front face, and it is supported so that follower rotation may be carried out at the fixing belt 20. The separation auxiliary member 9 may cover a fluororesin with small coefficient of friction with thermal resistance, such as PFA, FEP, and PTFE, on a front face, and it may press it so that it may slide with the fixing belt 20.

[0030] Drawing 5 is the enlarged drawing of the outlet of the nip section in this operation gestalt. By pressing the separation auxiliary member 9 and making the elastic layer of a fixing roller 4 distorted, the radius of curvature of the fixing belt 20 in the outlet of the nip section is locally made small. Since it is small, the radius of curvature R of the outlet of the nip section can raise the separability by the chewiness of a form 11. In addition, the spring 10 is omitted in drawing 5 .

[0031] Next, other operation gestalten are explained based on drawing 6 . With this operation gestalt, the separation auxiliary member 9 hangs a load to the hand of cut of the fixing belt 20, and it is prepared so that this fixing belt 20 may be slacked. Specifically, linear velocity of the separation auxiliary member 9 is made smaller than the linear velocity of the fixing belt 20. The radius of curvature of this fixing belt 20 is made small by this configuration. Also in this operation gestalt, since it is small, the radius of curvature R of the outlet of the nip section can raise the separability by the chewiness of a form 11.

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the outline front view of the anchorage device concerning 1 operation gestalt of this invention.

[Drawing 2] It is the expansion front view of the nip section circumference.

[Drawing 3] It is the outline front view of the color copying machine as image formation equipment.

[Drawing 4] It is the outline front view of the anchorage device in other operation gestalten.

[Drawing 5] It is the expansion front view of the nip section circumference of the anchorage device shown by drawing 4.

[Drawing 6] It is the expansion front view of the nip section circumference in other operation gestalten.

[Drawing 7] It is the expansion front view of the nip section circumference in the former.

[Description of Notations]

2 Fixing Belt

3 Heating Roller

4 Fixing Roller

5 Pressurization Roller

6 Halogen Heater as a Heat Source

9 Separation Auxiliary Member

402 Photo Conductor as Image Support

422 Rotating Type Developer as a Development Means

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[Translation done.]

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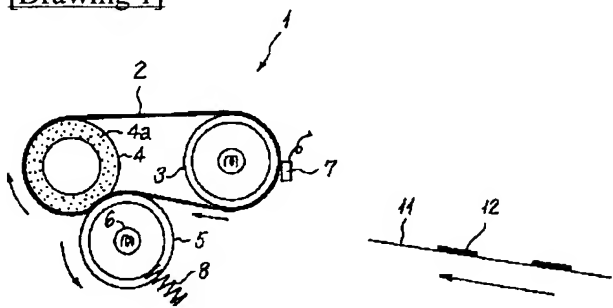
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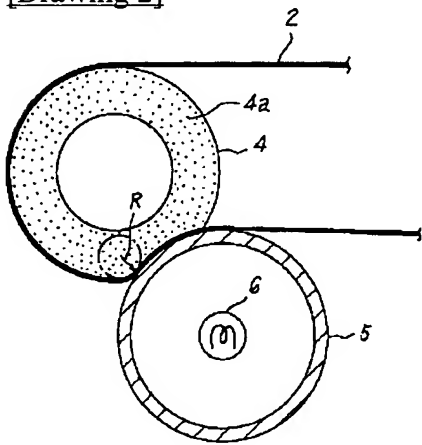
**DRAWINGS**

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[Drawing 1]



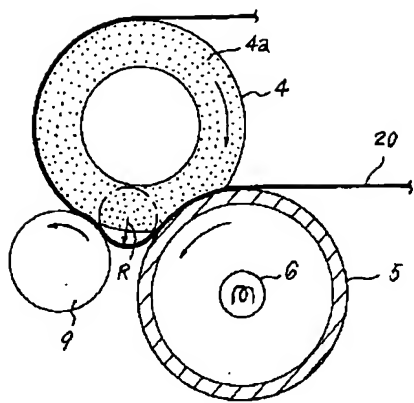
[Drawing 2]



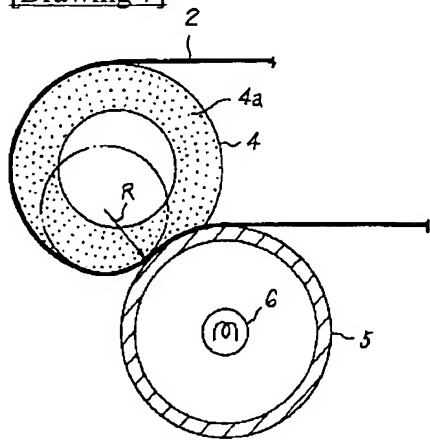
[Drawing 3]







[Drawing 7]



[Translation done.]